

REMARKS

Favorable reconsideration is respectfully requested.

The claims 9 to 11 and 13 to 18.

The above amendment to claim 9 is based on paragraph [0046] of the present specification in which the amount of naphthol sensitizer is defined as being from 0.1 to 3%.

Further, it is apparent that the percent is “by mass” as can be seen from page 18, paragraph [0056] of the present Specification.

The significance of this amendment will become further apparent from the remarks below.

Claims 9-10, 13, 15 and 17 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US 6,391,523) in view of Ohkawa et al. (US 6,368,769) in view of Kamabuchi et al. (US 2003/0148211).

This rejection is respectfully traversed.

The photosensitive resin composition of the present invention is able to achieve advantageous effects by employing a multi-functional bisphenol A novolak epoxy resin, a functionality of which is 5 functional groups or more, a cation polymerization initiator represented by the general formula (1) and a naphthol sensitizer at 0.1 to 3% by mass.

Thus, the present invention provides a photosensitive resin composition having high sensitivity, with the formation of patterns having low shrinkage in volume during a heat-setting process and high aspect ratio profile, by combining a multi-functional bisphenol A novolak epoxy resin including at least 5 functional groups, a cation polymerization initiator represented by the general formula (1) and a naphthol sensitizer at 0.1 to 3% by mass.

Additionally, in the present invention, an excessively high sensitivity of the photosensitive resin composition may make the dimensions of the resulting resin patterns thicker than those of a mask when a radiation beam is irradiated with a space existing between the mask and the resin. Such an increase in thickness is controlled without loss of sensitivity by the inclusion of the naphthol sensitizer (see paragraph [0044] of the present Specification).

From comparing Example 1 and Example 2 of the present Specification at page 22, it can be seen that, in Example 2 where a naphthol sensitizer is employed, the addition of the sensitizer reduces the line widths of the mask compared to Example 1 where a naphthol sensitizer is not

employed. It is obvious from Table 1 that, Example 1, where the line width is 8 μm , greatly differs from that of Example 2, where the line width is 7 μm .

Moreover, it is disclosed in the present Specification at [0046] that too high a percentage of the naphthol sensitizer in the photosensitive resin composition is not desirable because the resulting patterns have inversely-tapered shapes and their line widths are too thin.

Turning to the cited references:

Hurditch et al. discloses a composition for negative resist comprising an 8-functional bisphenol A novolak epoxy resin and a specific sulfonium salt type cation polymerization initiator, equivalent to those disclosed in the present Specification.

Ohkawa et al. discloses a stereolithographic resin composition comprising a cationically polymerizing organic compound and an energy beam sensitive cationic polymerization initiator, equivalent to those disclosed in the present Specification.

Ohkawa et al. discloses the use of a sensitizer such as anthracene derivatives, pyrene derivatives, and the like, if necessary.

Kamabuchi et al. discloses a chemical amplifying type positive resist composite comprising an acid generator comprising a sulfonium salt represented by the general formula (I) and at least one specified onium salt selected from the group consisting of substances represent by the general formula (IIa), (IIb), and (IIc); and a resin which contains a structural unit having a group that is unstable to acid and which is insoluble or slightly soluble by itself in an aqueous alkali but becomes soluble in the aqueous alkali by an action of acid.

According to Kamabuchi et al., a sensitizer may be represented by any compound as long as the compound promotes the photo reaction of the sulfonium salt represented by general formula (I). Various compounds are disclosed as a sensitizer in Kamabuchi et al. Accordingly, 1-naphthol sensitizer in Kamabuchi et al. is provided as one example of the sensitizer among the various sensitizers and is provided as a sensitizer equivalent to various sensitizers disclosed in Ohkawa et al. and Kamabuchi et al.

It is apparent that none of the cited references, alone or in combination, appreciate the advantages of employing a naphthol sensitizer in the presently recited proportion e.g. to achieve the above-discussed reduction in line width, etc.

Claims 11 and 18 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US 6,391,523) in view of Ohkawa et al. (US 6,368,769) and Kamabuchi et al. (US 2003/0148211) as applied to claim 9 above and in further view of Williamson et al. (WO 03/018663).

This rejection is also respectfully traversed.

Hurditch, Ohkawa and Kamabuchi are discussed above.

Williamson et al. discloses a linear polymeric 2-functional epoxy resin.

There is nothing in Williamson et al which overcomes the above-discussed deficiencies Hurditch, Ohkawa and Kamabuchi.

Claims 14 and 16 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US 6,391,523) in view of Ohkawa et al. (US 6,368,769) and Kamabuchi et al. (US 203/0148211) as applied to claim 9 above and in further view of Zweifel et al. (US 4,624,912).

This rejection is also respectfully traversed.

Hurditch, Ohkawa and Kamabuchi are discussed above.

Zweifel et al. merely relates to the use of a protective film and also clearly does not overcome the above-discussed deficiencies of Hurditch, Ohkawa and Kamabuchi.

It is apparent that none of the cited references, alone or in combination appreciates the advantageous use of the presently recited naphthol sensitizer in the presently recited proportions.

For the foregoing reasons, it is apparent that the rejections on prior art are intangible and should be withdrawn.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

Respectfully submitted,

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